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A MOBILE TELEPHONE CARRYING CASING

The present invention relates to a mobile telephone carrying casing.

In the past it has been recognised that the exterior of a mobile telephone is subject to considerable wear and tear in use. To improve the situation, mobile telephone carrying casings have been produced which encase the mobile telephone and offer some protection against wear and tear. The mobile telephone carrying casings also help prevent the mobile telephone encased in the carrying casing from becoming dirty. The carrying casings tend to be fairly low-cost items which can be replaced periodically. To date, mobile telephone carrying casings have typically been made of either leather or imitation leather. While these mobile telephone carrying casings do offer some protection to the mobile telephones encased therein, they are themselves not particularly hardwearing. In addition, the use of leather or imitation leather restricts the choice of colour and design. Furthermore, the carrying casings in current use do not significantly inhibit the escape of electromagnetic radiation or other potentially harmful waveforms.

The present invention provides, in a first aspect, a mobile telephone carrying casing which can encase, contain and protect a mobile telephone carried thereby, wherein:

the casing is an integer separate and independent from the carried mobile telephone which consists wholly or principally of a rigid plastics material;

the casing comprises at least two parts, defining

front and rear components, the front component encasing the front face of the mobile telephone and the rear component encasing the rear face of the mobile telephone, the components meeting in a line spaced apart from the front and rear faces of these components; and

the casing allows a user to operate the encased mobile telephone whilst carried in the casing.

Preferably, no part of the encased mobile telephone extends beyond the carrying casing. Preferably, the front and rear components meet in a plane substantially parallel to the front and rear faces.

Preferably, the front and rear components are attached by connecting means. Preferably, the connecting means include hinges.

Preferably, the two parts of the mobile telephone carrying casing are releasably attached by connecting means. Preferably, the connecting means comprises one or more clips located on one or more of the components which fasten to opposing mating hooks or recesses provided on another component.

Advantageously, the connecting means comprises a tongue and groove arrangement, with one or more tongues provided on one or more of the components which are slidably held in one or more grooves provided on another component.

Preferably, the carrying casing is provided with electromagnetic radiation screening means. Preferably, the electromagnetic radiation screening means provides

a shield positioned between a head of a user and the encased mobile telephone. Preferably, the electromagnetic radiation screening means causes attenuation of the electromagnetic radiation only on the side of the casing nearest a head of a user, the electromagnetic radiation being free to radiate from the remainder of the casing without attenuation.

Advantageously, the electromagnetic radiation screening means is selectively incorporated in one or more desired regions of the casing.

Preferably, the electromagnetic radiation screening means comprises a coating on one or more surfaces of one or more of the components of the carrying casing. Preferably, the coating comprises metallic particles. Advantageously these metallic particles are nickel, copper, silver, or gold. Preferably the coating comprises metallic particles which are alloys of two or more metals. Preferably, the coating is a paint. Preferably, the coating is sprayed on a surface of the carrying casing.

In a further preferred embodiment, the electromagnetic radiation screening means comprises a mesh. Preferably, the mesh comprises a metal or an alloy of metal. Advantageously, the mesh comprises a composite material. Preferably, the mesh comprises apertures whose maximum dimension is less than one half of a wavelength of the smallest wavelength electromagnetic radiation emitted by the carried mobile telephone.

Preferably, the electromagnetic radiation screening means provided in the casing forms a screen

between a head of a user and the sources of electromagnetic radiation in the carried mobile telephone.

Preferably, the electromagnetic radiation screening means is selectively positioned in the casing so that it does not impair the function of the mobile telephone.

Advantageously, the mobile telephone carrying casing comprises an aperture for alignment with an earpiece of the mobile telephone carried thereby. Preferably, a mobile telephone carrying casing comprises an aperture for alignment with a microphone of a mobile telephone carried thereby. Preferably, the mobile telephone carrying casing comprises an aperture through which volume control keys of the carried mobile telephone are accessible. In a preferred embodiment, the mobile telephone carrying casing comprises an aperture through which a display screen of the carried mobile telephone can be viewed.

Preferably, the mobile telephone carrying casing comprises an aperture through which an aerial from a mobile telephone can project. Preferably, the mobile telephone carrying casing comprises an aperture through which the mobile can be recharged.

Preferably, at least one of the above mentioned apertures is shielded by at least one cover. Preferably, these covers are retractable. Advantageously, these covers are provided with electromagnetic radiation screening means to attenuate electromagnetic radiation.

Preferably, the mobile telephone carrying casing is injection moulded from a thermo-plastic, such as ABS or ABS/Polycarbonate blend.

In a further preferred embodiment, the mobile telephone carrying casing comprises a membrane key pad and a number of apertures through which the membrane key pad can project, thus enabling activation of the keys located on the encased mobile telephone by depression of the keys on the membrane key pad. Preferably, the membrane key pad is attached to the remainder of the carrying casing. Preferably, at least one of the apertures is shielded by at least one cover. Preferably, the cover is retractable.

Preferably, the membrane keypad is provided with electromagnetic radiation screening means to attenuate electromagnetic radiation.

Preferably, at least one of the exterior surfaces of the mobile telephone carrying casing contains grooves which ease gripping and thus opening of one component of the casing from another component of the casing.

Advantageously, the mobile telephone carrying casing comprises attachment means for attaching the carrying casing to clothing of a user. Preferably, the attachment means can attach the carrying casing to a belt of the user, or to a holster located in a fixed place, such as the dashboard of a car.

In a second aspect, the present invention provides a mobile telephone carrying casing which can encase, contain, and protect a mobile telephone

carried thereby, wherein:

the casing is an integer separate and independent from the carried mobile telephone which consists wholly or principally of a rigid plastics material;

the casing comprises at least two parts which can be separated to allow introduction of a mobile telephone between the parts and joined together to encase the introduced mobile telephone;

at least one part is provided with electromagnetic radiation screening means; and

the casing allows a user to operate the encased mobile telephone whilst carried in the casing.

Preferably, the electromagnetic radiation screening means provides a shield positioned between a head of a user and the encased mobile telephone.

Preferably, the electromagnetic radiation screening means causes attenuation of the electromagnetic radiation only on the side of the casing nearest a head of a user, the electromagnetic radiation being free to radiate from the remainder of the casing without attenuation.

Preferably, the at least two casing parts define front and rear components, the front component encasing the front face of the mobile telephone and the rear component encasing the rear face of the mobile telephone, the components meeting in a line spaced apart from the front and rear faces of these components.

Preferably, the electromagnetic shielding means comprises a coating on a surface of one of the parts.

Preferably, the coating comprises an RF conductive coating. Preferably the coating is sprayed on a interior surface.

In a third aspect of the present invention, there is provided use of the mobile telephone carrying case described above to encase, contain and protect a mobile telephone, the mobile telephone already having a casing which is an integral part of the mobile telephone.

In a fourth aspect of the present invention, there is provided a method of encasing, containing and protecting a mobile telephone, and of screening electromagnetic radiation emitted by the mobile telephone, the method comprising the steps of:

providing a carrying casing which is an integer separate and independent from the carried mobile telephone which consists wholly or principally of a rigid plastics material, the casing comprising at least two separable parts having connecting means and an electromagnetic screening means,

separating the casing into the at least two parts;

introducing the mobile telephone to be carried into one of the separated parts; and

joining the at least two parts to encase the mobile telephone and using the connecting means to secure the casing; wherein:

the method allows a user to operate the mobile telephone whilst carried in the casing; and

the electromagnetic screening means attenuates electromagnetic radiation emitted by the carried mobile telephone.

It should be appreciated that when the word rigid is used in the specification, it does not imply that the material is completely rigid, and instead the material can have some flexibility provided that it is capable of being self-supporting and is certainly more rigid than a sheet of leather or a sheet of imitation leather; i.e. it is not a pliable sheet material.

The mobile telephone carrying casing provided by the present invention is both sturdy and hard wearing to protect the encased mobile telephone against wear and tear, and also offers a large variety of alternatives in terms of colour and design. The carrying casing may additionally incorporate screening means to inhibit the escape of electromagnetic radiation generated by a carried mobile telephone in the direction of a user.

Preferred embodiments of the present invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a mobile telephone carrying casing according to a first embodiment of the present invention;

Figure 2 is a perspective view of the mobile telephone carrying casing of Figure 1, showing the carrying casing separated into two parts;

Figure 3 is a different perspective view of the two separated parts of the mobile telephone carrying casing of Figures 1 and 2, showing the interior surfaces of the carrying casing parts;

Figure 4 is a detail perspective view of the lower portion of a rear part of carrying casing according to the present invention, showing an alternative clip arrangement used to releasably join

the two parts of the carrying casing;

Figure 5 shows in detail the two carrying casing parts joined together using the clip arrangement of Figure 4;

Figure 6 is a top plan view of the mobile telephone carrying casing of Figures 1 to 3;

Figure 7 is a side elevation view of the mobile telephone carrying casing of Figures 1 to 3 and 6;

Figure 8 is a front elevation view of the mobile telephone carrying casing of Figures 1 to 3, 6 and 7;

Figure 9 is a rear perspective view from above of the mobile telephone carrying casing of Figures 1 to 3 and 6 to 8;

Figure 10 is plan view of a membrane key pad which may be inserted or attached to a mobile telephone carrying casing according to the present invention;

Figure 11 is a perspective view of the separated parts of a mobile telephone carrying casing before assembly, shown with the rear part carrying a mobile telephone; and

Figure 12 is a perspective view of the mobile telephone carrying casing of Figure 11, together with the membrane key pad of Figure 10, shown carrying the mobile telephone.

Referring first to Figure 1, the present invention can be seen to comprise a mobile telephone carrying casing 10 which is formed of rigid plastics material, most preferably from ABS (Acrylonitrile Butadiene Styrene) plastic, or an ABS/Polycarbonate blend, which is a tough material with good resistance to impact, even at low temperatures, and which can be printed on without pretreatment. In this particular embodiment, as can best be seen in Figure 12, the

carrying casing 10 can be seen to fully encase a carried mobile telephone 50 so that no part of the mobile telephone 50 extends beyond the carrying casing 10. In fact, the mobile telephone carrying casing 10 comprises essentially two parts, a front component 11 and a rear component 12, which meet and can be releasably joined in a line spaced apart from the front and rear faces of these components 11, 12. Although the join between the front and rear components 11, 12 is shown to be a straight line, this need not necessarily be so and may instead be, for example, of castellated or sinusoidal form.

Figures 2 and 3 show the mobile telephone carrying casing 10 separated into its two parts, front component 11 and rear component 12. Numerous apertures are visible, some defined by the joining of the components 11, 12. For example, aperture 15 allows the display screen of a mobile telephone (not shown) to be viewed. Apertures 16, 17 may be used for alignment with a microphone or earpiece of a mobile telephone. Aperture 18 may be used to give access to the base of a mobile telephone for recharging a battery or for connecting an accessory such as a hands-free lead. Aperture 19 may be used to give access to volume control keys or other function keys of a mobile telephone. Aperture 20 enables a function light of a mobile telephone to be viewed. Apertures 25 allow the membrane key pad 35 of Figure 10 to protrude therethrough enabling activation of the keys of a mobile telephone through depression of the keys 36 of the membrane key pad 35. The membrane key pad 35 protects the keys of a mobile telephone which are relatively expensive and complicated to replace, unlike those of the membrane key pad 35.

In order to fully encase and protect a carried mobile telephone 50, the apertures provided in the carrying casing 10 may be provided with shields or removable covers. Aperture 15, in particular, may be fitted with a transparent shield 21 to protect the display unit of a mobile telephone. Alternatively, the membrane key pad 35 may incorporate a protective translucent portion 37 to overlay the display unit of a mobile telephone. All other apertures 16, 17, 18, 19, 20 may be provided with removable covers (not shown). These covers may, for example, be manufactured from a resilient pliable material such as rubber or silicone and shaped for effective sealing upon insertion into the respective apertures 16, 17, 18, 19, 20.

It will be appreciated that the internal surfaces of the mobile telephone carrying casing 10 must conform to the external shape of a carried mobile telephone 50. Therefore, each carrying casing 10 is specific to one particular model of mobile telephone, there being different carrying casing 10 versions available for each model of mobile telephone (unless, of course, different models of mobile telephone are substantially similar geometrically). Accordingly, apertures 15, 16, 17, 18, 19, 20, 25 will vary in number, shape and position on different versions of the carrying casing 10 to accommodate the range of different mobile telephones available. Also, in an alternative embodiment, the carrying casing 10 may be provided with additional apertures to enable parts of a mobile telephone to extend therethrough, such as, for example, an extendable antenna.

The front and rear components 11, 12 may be

connected in several ways. In Figures 2, 4 and 5, the carrying casing 10 is simply provided with clips 30 which locate in corresponding recesses provided in the opposing component. A plurality of clips 30 may be provided to join the rear component 12 to the front component 11 at various locations along the mating edges. The clips 30 may of course project from the mating edges of either one of the front component 11 or rear component 12, or indeed both, as long as they are suitably positioned with respect to receiving recesses in the opposing component. As can best be seen in Figures 4 and 5, clips 30 are shown to be a moulded part of the front or rear component 11, 12, although only joined to the respective component 11, 12 along the base of clip 30. The outer surface of clip 30 may be provided with grooves 35 which ease gripping of the clip 30. Thus, depression of clip 30 at a location 28 will move the head 27 of clip 30 out of the recess and thus disengage clip 30, allowing for separation of front and rear components 11, 12 respectively.

Alternatively, as can be seen in Figure 3, a clip 30, tabs 32 and corresponding recesses 31, 33 are provided. Clip 30 is conveniently located on the front component 11 towards the top of the carrying casing 10. A corresponding recess 31 is provided on rear component 12 in which clip 30 locates. Tabs 32 are used in conjunction with recesses 33 to provide an interlocking arrangement which permits the carrying casing parts 11, 12 to be brought together into abutment at a portion below tabs 32, whereupon the carrying casing parts 11, 12 are rotated towards each other so as to close the carrying casing 10. When fully closed, clip 30 is received by recess 31 and

thus holds the front and rear components 11, 12 in a closed condition until clip 30 is released from recess 31 as described above.

Alternative connecting means may be used in conjunction with, or instead of, clips 30 or tabs 32. For example, a tongue and groove arrangement may be employed by providing the edges of the respective front and rear components 11, 12 with portions or continuous lengths of respective protrusions and recesses such that the two components 11, 12 may be brought together into abutment in a perpendicular direction, and then slid in opposite longitudinal directions so as to interlock. Additionally, a clip 30 or button may be provided which is activated when the two components 11, 12 are fully interlocked. Such an arrangement is well known in the art for attaching a battery to a mobile telephone. Alternatively, hinges may be used in conjunction with clips 30, 32.

As can be seen in the Figures, and as described above, the inside of the carrying casing 10 generally conforms to the shape of a mobile telephone such that there is limited relative movement between the encased mobile telephone 50 and the carrying casing 10. Optionally, as can be seen in Figures 3 and 4, a number of ridges 40 may be provided on the internal surface of the rear component 12. These aid in securing a mobile telephone within the carrying casing 10. In addition, their limited contact area with the mobile telephone reduces the amount of conduction of heat away from the mobile telephone and to the user via the carrying casing 10, thus increasing comfort for the user, particularly during extended periods of use. Furthermore, air which is present in the space

between the mobile telephone and the carrying casing 10 may provide for convection of heat away from the mobile telephone.

The mobile telephone carrying casing 10 is more resistant to wear than leather or imitation leather carrying casings known in the art, and can be made of many different colours and designs. Thus, the carrying casing 10 of the present invention can be made aesthetically pleasing.

In particular, the rigid plastics material of the carrying casing 10 can be printed on without pretreatment, enabling a number of surface finish treatments to be applied following manufacture. These treatments may include spraying or dipping the front and rear components 11, 12 in paint or applying decals or transfers. Alternatively, the carrying casing 10 may simply be produced in a desired colour by selection of appropriately coloured raw materials, or by applying a colouring during the manufacturing process. Also, recently developed techniques enable intricate and vivid artworks to be applied to moulded plastics articles as part of a mass manufacturing process. One such process is that of Keytech and is the subject of UK patent number 2120169. The Keytech process is a thermostatic printing process which enables a sharply detailed, vibrant multicolour artwork to be reproduced exactly and repeatedly. Multiple colour dyes are applied using heat and pressure to penetrate up to 6 mils into the carrying casing 10 with precise registration and clarity. The resulting artwork impregnates the carrying casing 10 in such a way that it is indelible and therefore extremely resistant to scratching and general wear and

tear experienced by the carrying casing 10.

Referring now to Figures 6, 7 and 9, the mobile telephone carrying casing 10 can be seen to be provided with an attachment means 45 on, for example, the rear component 12 to enable attachment to clothing of a user. For instance, the attachment means 45 may comprise a hook or belt clip which could be provided on the rear component 12 in order to enable the carrying casing 10 to be hooked onto a belt of a user or to a holster located in a fixed place, such as the dashboard of a car.

In the embodiment shown, a mobile telephone will be removed from the carrying casing 10 when a battery needs replacing, although it would be possible to design a carrying casing 10 with an aperture in the rear component 12 permitting battery replacement. Furthermore, the rear component 12 may itself be made in two portions such that one portion may be designed to cover the battery. This battery covering portion would then be easily removable in its entirety, or may be moved out of the way by the use of a hinge or sliding arrangement attaching it to the remaining portion of the rear component 12. This would facilitate quick and easy removal and replacement of a battery. Likewise, the front component 11 may also be formed of separate attachable portions so as to facilitate access to the keys, display screen or other functions of a mobile telephone which would otherwise be encased.

The front and/or rear components 11, 12 may additionally provide a screening function so as to limit exposure of a user to electromagnetic radiation

generated by a mobile telephone. The effects upon the human body of electromagnetic radiation generated by mobile telephones has been the subject of considerable debate. It has been intimated that emissions from mobile telephones may be detrimental to human health. In the absence of conclusive evidence either way, the applicant considers it prudent to limit exposure of a user by incorporating materials known to be effective in screening electromagnetic radiation within parts of the carrying casing 10.

The applicant has established in tests that coating the carrying casing 10 with an RF (radio frequency) conductive paint comprising metallic particles such as nickel, copper, silver, gold or mixtures or alloys thereof is effective in attenuating the field strength of electromagnetic radiation measured at near and far field locations by up to approximately 70 to 90%. In particular, a nickel coating was found to attenuate the electromagnetic radiation field strength by up to 90%.

There are two key parameters to consider when providing an effective screening coating; the conductivity and the thickness of the coating. The greater the conductivity of the coating, the greater the attenuation of electromagnetic radiation. Also, for the coating to be effective, there must be a deposit of at least one 'skin depth' (i.e. at least one particle thickness) of coating. Typically, the carrying casing 10 is provided with a coating thickness in the range of 25-50μm, which provides up to 10 skin depths dependent upon the size of particle used in the coating.

To ensure good screening, the entire interior surface of front component 11 is covered with conductive paint, typically by spray coating. It is preferable to cover the interior surface with paint since it is less liable to wear and because the paint does not interfere with aesthetic exterior surface coatings which can be applied. The inward facing surface of the membrane key pad 35 can also be covered with conductive paint to minimise electromagnetic radiation emissions from the carrying casing 10. Likewise, any shield 21 or covers provided for apertures 15, 16, 17, 18, 19, 20 may be coated with conductive paint. However, even if left uncoated, certain apertures (e.g. 17, 18) do not necessarily compromise the integrity of the screening provided by the conductive paint. The critical parameter is the dimension of one half of a wavelength of the electromagnetic radiation generated by a mobile telephone. Electromagnetic radiation cannot pass through a screening element having apertures whose maximum dimensions are less than one half of the wavelength of the shortest wavelength electromagnetic radiation. Screening elements such as nickel wire mesh and other metallic meshes exploit this physical characteristic in applications such as the doors of microwave ovens. In such an application, electromagnetic radiation is substantially contained within the oven by the mesh contained within the door, yet it is possible to look through the mesh to see inside the oven. Electromagnetic radiation emitted by mobile telephones is typically in the frequency range 500 Mhz to 2 Ghz, but is preferably 950 Mhz or 1.5 Ghz. Corresponding electromagnetic radiation wavelengths fall in the range of 0.01 to 0.02m. Thus, an aperture in the conductive paint of less than

0.005m will not compromise the attenuation achieved.

It is most important to coat the front component 11 since this faces a head of a user and provides a shield directly between the source of the electromagnetic radiation and the head of a user. Whilst it is preferable that the inner surfaces of front component 11 and associated shield 21 and covers be coated in order to minimise damage to the coating, screening is equally effective when the coating is applied to the corresponding outer surfaces, either instead of, or as well as, a coating applied to interior surfaces.

Whilst field strengths and electromagnetic radiation emissions vary from mobile telephone to mobile telephone, it is generally understood that the primary sources of radiation are the antenna and the power pack of a mobile telephone. By completely coating the front component 11, the membrane keypad 35, and the shield 21 of aperture 15, the head of the user is entirely screened from the sources of electromagnetic radiation. Whilst this arrangement provides effective screening in the direction of the head of the user, signals may be emitted and received via the unscreened rear component 12 without attenuation. This directional screening solves the problem experienced by prior art screening devices which seek to contain overall electromagnetic radiation emissions from a mobile telephone which can, in turn, result in overheating of the mobile telephone, loss of signal strength, loss of operating range, reduced battery life and poor sound quality.

Additional reductions in electromagnetic radiation

emissions can also be achieved in the carrying casing 10 of the present invention by selectively coating areas of the interior surfaces of rear component 12. It has been found that coating the entire internal surface of component 11 and partial coating of rear component 12, whilst limiting the electromagnetic radiation received by a head and hand of a user, does not impair the functioning of a mobile telephone encased by the carrying casing 10.

It will be appreciated, therefore, that selective screening of the carrying casing 10 is possible so as to provide effective screening of electromagnetic radiation in the direction of a user without experiencing the impaired mobile telephone function associated with prior art devices.

Whilst in the embodiment described above electromagnetic radiation screening is provided by means of a coating of conductive paint, other forms of screening element could be used. For example, effective screening could alternatively be provided in the form of a layer of mesh material which is embedded within the carrying casing 10 during moulding. Also, particulate materials may be added to the raw materials before or during manufacture so as to form a matrix of screening elements throughout the carrying casing 10. It will be appreciated that the carrying casing 10 may be selectively screened as described above using these alternative elements. A mesh or matrix of screening elements may also be provided within the shield 21 or covers used for apertures 15, 16, 17, 18, 19, 20, 25 or within the membrane key pad 35. This is particularly advantageous where it is important for a user to view underlying information

displayed on or by the encased mobile telephone 50 which would otherwise be covered by an opaque coating of conductive paint.

It will be appreciated that many modifications may be made to the above described embodiments of the present invention without departing from the scope of the invention. For example, new electromagnetic radiation screening technologies may be implemented within the carrying casing 10. New designs of mobile telephone with substantially different geometries, such as flip phones, can be catered for with suitable amendment to the geometry of carrying casing 10. Also, it will be appreciated that the carrying casing 10 could be split into upper and lower components as opposed to front and rear components. Such an arrangement may be especially desirable when a mobile telephone to be encased is of substantially continuous cross section so as to permit its introduction into the two or more components of the carrying casing 10.